

**CIVIL SPECIFICATIONS  
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## SECTION 02210

### EROSION CONTROL

1. SCOPE

Under this section shall be included all measures both temporary and permanent to control erosion and sedimentation, and protect all surface waters and property both on and off site. This shall include all labor, materials and equipment necessary to meet the requirements of this Section.

2. GENERAL

- a. It is the intent of this Specification that the Project and the Contractor comply with all applicable requirements of the "Manual for Erosion and Sedimentation Control in Georgia," and Local Ordinances.
- b. The Manual for Erosion and Sediment Control in Georgia further defines practices and requirements. The Contractor is responsible for maintaining all sediment and erosion control measures on the project site during construction. The Contractor is responsible for any damage caused due to failure to implement these requirements. A Soil Erosion and Sedimentation Control Permit has been obtained by the Owner so that periodic inspections may be made by the Permittee. The Contractor is to cooperate with the person performing these inspections.

3. PLANS

A Soil Erosion and Sedimentation Control Plan is included in the Contract Documents and is to be implemented as a part of the procedures necessary to implement requirements of the Manual for Erosion and Sedimentation Control in Georgia.

4. IMPLEMENTATION

Implementation of these requirements is based on the following principles:

- a. The disturbed area and the duration of exposure to erosion elements should be minimized.
- b. Stabilize disturbed areas immediately.
- c. Utilization of sediment basins and sediment traps.
- d. Retain sediment.
- e. Do not encroach upon watercourses.

5. SYMBOLS

The Soil Erosion and Sedimentation Control Plan contains standard symbols for the different types of measures for implementing the Act. These symbols are defined for conditions, design criteria and construction specifications in Sections II and III of the Manual.

6. SPECIFIC REQUIREMENTS

- a. All disturbed areas shall be grasses by sodding or seeding, fertilizing, mulching and watering to obtain a ground cover which prevents soil erosion.
- b. A temporary construction egress pad shall be installed and maintained at any point where construction vehicles enter a public right-of-way, street or parking area. The pad shall be used to eliminate mud from the construction area onto public rights-of-way. The pad shall be constructed as shown in the Manual for Erosion and Sediment Control.
- c. All measures installed for sediment control shall be checked at the beginning and end of each day when construction is occurring to ascertain that the measures are in place and functioning properly.

**END OF SECTION 02210**

## **Section 02220 - Trenching for Utility Systems**

### **1. Scope**

Under this heading shall be included the trenching required for all underground utility systems. Utility systems include Storm Drainage System, Section 02400.

### **2. General**

- a. Underground piping and utility systems which are to be installed in trenches whose lowest point of excavation is below the existing ground level, and are unaffected by an excavation for structures, may be installed at any time during the course of the work. Piping and systems to be installed in or over fill, backfill or new embankments shall not be installed until all earthwork has been completed to rough grade, nor until settlement of the fill or embankment has taken place.
- b. Braced and sheeted trenches and open trenches shall comply with all state laws and regulations, and local ordinances relating to safety, life, health and property. Also, this shall conform to applicable Federal Regulations.
- c. The sides and bottoms of the trenches shall be protected against any instability which may interfere with the proper laying of the pipe and as necessary for the safety of the workmen and others and as may be necessary to protect adjacent structures.

### **3. Location and Protection of Utilities and Structures**

- a. It shall be the responsibility of the Contractor to acquaint himself with the location of all utilities and structures both present and proposed, also all existing surface structures which may be affected by work under the Contract. The location of any underground structures furnished, shown on the Plans or given on the site are based upon the available records but are not guaranteed to be complete or correct, and are given only to assist the Contractor in making a determination of the existence of underground structures.
- b. Overhead utilities, poles, etc., shall be protected against damage by the Contractor, and if damaged by the Contractor, shall be replaced by him. The Contractor shall notify those who maintain utilities sufficiently in advance of the proposed construction so that they may locate, uncover and disclose such work. If the progress of construction necessitates the removal or relocation of poles, overhead utilities and obstructions, the Contractor shall make all arrangements and assume all costs of the work involved.
- c. The Contractor shall provide for the continuance of the flow of any sewers, drains, water pipes, and water courses, and the like. Where such facilities, water courses, or electric overhead wires or conduits are interfered with by the work of the Contractor, the

interruption shall be a minimum and shall be scheduled in advance with the Architect and the utility owner.

- d. The Contractor shall restore all facilities interfered with to their original condition or acceptable equivalent. The cost of such restoration or damage caused directly by his work shall be paid for by the Contractor and shall be included in the prices bid for the items to which it pertains.

#### 4. **Excavation and Trenching**

A. Excavation.

Excavate all materials encountered.

B. Caution in Excavation.

The Contractor shall proceed with caution in the excavation and preparation of the trench so that the exact location of underground structures in the trench zone may be determined before being damaged. He shall be held responsible for the repair or replacement of such structures when broken or otherwise damaged because of his operations.

C. Subsurface Explorations.

The Contractor shall make explorations and excavations at no additional charge to the Owner to determine the location of existing underground structures.

D. Depth of Trench.

Utilities and other piping shall be laid in open trenches as shown and specified. Trenches shall be excavated to the designated lines and grades, beginning at the outlet end and progressing toward the upper end in each case. Trenches for pipe shall be shaped to the lower 1/3 of the pipe and provide uniform and continuous bearing. Bell holes shall be dug to allow ample room for working fully around each joint.

E. Width of Trench.

Trenches shall be of minimum width to provide ample working space for making joints and tamping backfill. Width on each side of barrel of pipe shall be not less than 8 inches or more than 12 inches. Sides of trenches shall be closely vertical to top of pipe and shall be sheet piled and braced where soil is of unstable nature. Above the top of the pipe, trenches may be sloped. The width of the trench above this level may be wider for sheeting and bracing and the performance of the work.

F. Alignment and Grade.

Trenches shall be excavated on the alignments shown on the Plans, and to the depth and grade necessary to accommodate the pipes at the elevations shown. Where elevations of

the invert or centerline of a pipe are shown at the ends of a pipe, the pipe shall be installed at a continuous grade between the two elevations.

G. Over Excavation.

- a. Excavation in excess of the depth required for proper shaping shall be corrected by bringing to grade the invert of the ditch with compacted coarse, granular material at no additional expense to the Owner. Bell holes shall be excavated to relieve bells of all load, but small enough to insure support is provided throughout the length of the pipe barrel.
- b. Excavation in excess of the depths required for manholes and other structures shall be corrected by placing a sub foundation of 1500 psi concrete, at no additional expense to the Owner.
- c. If trenches are excavated to widths in excess of those specified, or if the trench walls collapse, the pipe shall be laid in accordance with the next better class of bedding at the expense of the Contractor.

**5. Trenches**

- a. Trenches shall be maintained in a safe condition to prevent hazardous conditions to persons working in or around the trench. Braced and sheeted trenches and open trenches shall comply with all State and Federal Laws and Regulations, and local ordinances relating to safety, life, health and property.
- b. The top portion of the trench may be excavated with sloping or vertical sides to any width which will not cause damage to adjoining structures, roadways, utilities, etc. The bottom of the trenches shall be graded to provide uniform bearing and support each section of the pipe on undisturbed soil at every point along its entire length, except for the portions of the pipe sections excavated for bell holes and for the sealing of pipe joints. Bell holes and depressions for joints shall be dug after the trench bottom has been graded and in order that the pipe rests upon the trench bottom for its full length and shall be only of such length, depth and width for making the particular type of joints. The bottom of the trench shall be rounded so that at least the bottom one-third of the pipe shall rest on undisturbed earth for the full length of the barrel as jointing operations will permit. This part of the excavation shall be done manually only a few feet in advance of the pipe laying by workmen skilled in this type of work.
- c. The sides of all trenches and excavation for structures shall be held by stay bracing, or by skeleton or solid sheeting and bracing according to conditions encountered, to protect the excavation, adjoining property and for the safety of personnel. Bracing and shoring may be removed when the level of the backfilling has reached the elevation to protect the pipe

work and adjacent property. When sheeting or shoring above this level cannot be safely removed, it may be left in place. Timber left in place shall be cut off at least 2 feet below the surface. No sheeting below the level of the top of the pipe may be removed.

**6. Limit to Length of Open Trench**

All excavated material shall be piled in a manner that will not endanger the work and that will avoid obstructing roadways.

**7. Protection of Water Supply Pipes**

A. Horizontal Separation.

Sewers and force mains shall be laid at least 10 feet horizontally from any existing or proposed water main. The distance shall be measured edge to edge. In cases where it is not practical to maintain a 10-foot separation, such deviation may allow installation of the sewer or force main closer to a water main, provided that the water main is in a separate trench or on an undisturbed earth shelf located on the side of the sewer or force main and at an elevation so the bottom of the water main is at least 18 inches above the top of the sewer or force main.

B. Crossings.

Sewers and force mains crossing water mains shall be laid to provide a minimum vertical distance of 18 inches between the outside of the water main and the outside of the sewer or force main. This shall be the case where the water main is either above or below the sewer or force main. The crossing shall be arranged so that the sewer or force main joints will be equidistant and as far as possible from the water main joints. Where a water main crosses under a sewer or force main, adequate structural support shall be provided for the sewer or force main to prevent damage to the water main.

C. Special Conditions.

When it is impossible to obtain proper horizontal and vertical separation as stipulated above, the sewer or force main shall be designed and constructed equal to water pipe, and shall be pressure tested to assure water tightness prior to backfilling.

**END OF SECTION**

## SECTION 02400

### STORM DRAINAGE SYSTEM

1. SCOPE  
Under this heading shall be included all operations in connection with the installation of the storm drainage and subsurface systems.
2. EXCAVATION AND BACKFILL  
Excavation and backfilling shall be as specified in Section 02221, Excavation, Trenching and Backfilling for Utility Systems.
3. DELIVERY, STORAGE, AND HANDLING OF MATERIALS
  - A. Delivery and Storage.  
Materials delivered to site shall be inspected for damage, unloaded, and stored with the minimum of handling. Do not store materials directly on the ground. Inside of pipes and fittings shall be kept free of dirt and debris.
  - B. Handling.  
Materials shall be handled in such a manner as to insure delivery to the trench in sound undamaged condition. Pipe shall be carried to the trench, not dragged. Gasket materials and plastic materials that are not to be installed immediately shall not be stored in the direct sunlight.
4. PIPE FOR CULVERTS AND STORM DRAINS  
Pipe for culverts and storm drains shall be as indicated and shall conform to requirements for the following types.
  - A. Corrugated Polyethylene, Smooth Pipe – High Density (HDPE)  
Except where noted, pipes 12” and larger shall be high density polyethylene pipe with an integrally ASHTO M-294, Type S.
    1. Joints.
      - a. The assembly of the gasketed joint shall be performed as recommended by the pipe manufacturer. The elastomeric gaskets may be supplied separately in cartons or prepositioned in the bell joint or coupling at the factory. In all cases, clean the gasket, the bell or coupling interior, especially the groove spigot area to remove any dirt or foreign material before assembling. Inspect the gasket, pipe spigot bevel, gasket groove, and seating surfaces for damage or deformation. When gaskets are separate, use only gaskets which are designed for and supplied with the pipe. Insert them as recommended by the manufacturer.



- b. Lubricant should be applied as specified by the pipe manufacturer. Align the spigot to the bell and insert the spigot into the bell until it contacts the gasket uniformly.

- B. Corrugated Polyethylene, Smooth Pipe – High Density (HDPE)  
Except where noted, pipes 12” and larger shall be high density polyethylene pipe with an integrally ASHTO M-294, Type S.

5. **DRAINAGE STRUCTURES**

Drainage structures shall be of the following types, constructed of the materials specified for each type and in accordance with the indicated details.

A. Manholes and Inlets.

Construction shall be of reinforced concrete, plain concrete, brick, precast reinforced concrete or precast concrete segmental blocks, complete with frames and covers or gratings. Precast concrete manholes and inlets shall be designed for the required depth and to sustain the required wheel loads and/or surface pressures. When manholes and inlets are to be constructed of prefabricated materials, shop drawings shall be submitted for approval before ordering the material.

B. Connection to Existing Inlets and/or Manholes.

Pipe connections to existing inlets and/or manholes shall be in such a manner that the finished work will conform as nearly as practicable to the applicable requirements specified for new inlets and/or manholes, including all necessary concrete work, cutting and shaping.

6. **MATERIALS FOR DRAINAGE STRUCTURES:**

A. Mortar.

1. Mortar for connections to other drainage structures, and brick or block construction shall conform to ASTM C270, Type M, except the maximum placement time shall be one hour. Hydrated lime may be added to the mixture of sand and cement in a quantity equal to 25 percent of the volume of cement used. Hydrated lime shall conform to F.S. SS-L-351, Type M, or ASTM C141, Type A.
2. The quantity of water in the mixture shall be sufficient to produce a stiff workable mortar but in no case, shall exceed 2.65 liters of water per sack of cement. Water shall be clean and free of harmful acids, alkalis, and organic impurities. The mortar shall be used within 30 minutes after the ingredients are mixed with water.

- B. Concrete.  
Refer to Architectural Division for Concrete.
- C. Precast Reinforced Concrete Manholes.  
Manholes shall conform to ASTM C478 or AASHTO M199. Joints between precast concrete risers and tops shall be full-bedded in cement mortar and shall be smoothed to a uniform surface on both exterior and interior of the structure or joints may be made with flexible rubber-type gaskets.
- D. Precast Concrete Segmental Blocks.  
Blocks shall conform to ASTM C139, not more than 8 inches thick, not less than 8 inches long, and of such shape that joints can be sealed effectively and bonded with cement mortar.
- E. Bricks.  
Bricks shall conform to ASTM C62, Grade SW; ASTM C55, Grade S-I or S-II; or ASTM C32, Grade MS. Mortar for jointing and plastering shall consist of one part of portland cement and two parts fine sand. Lime may be added to the mortar in a quantity not more than 25 percent of the volume of cement. The joints shall be filled completely and shall be smooth and free from surplus mortar on the inside of the structure. Brick structures shall be plastered with 3/4 inch of mortar over the entire outside surface of the walls. For square or rectangular structures, brick shall be laid in stretcher courses with a header course every sixth course. For round structures, brick shall be laid radially with every sixth course a stretcher course.
- F. Frame and Cover or Gratings.  
Fabrication shall be from one or more of the material operations presented in F.S. RR-F-621, except the malleable cast iron option shall conform to ASTM A220, Grade 4001O. Weight, shape, size and waterway openings for grates and curb inlets shall be as indicated on the plans. Frames and covers for curb inlets and for areas not subject to vehicular traffic or storage may be malleable iron if so indicated. Malleable iron frames and covers shall conform to ASTM A220 and shall be of the weight, shape and size indicated.

7. BEDDING

See Section 02221 "Excavation, Trenching and Backfill for Utility Systems," for additional requirements.

8. PLACING PIPE

Each pipe shall be carefully examined before being laid, and defective or damaged pipe shall not be used. Pipe lines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. Under

no circumstances shall pipe be laid in water, and no pipe shall be laid when trench conditions or weather are unsuitable for such work. Pipe shall be moved horizontally into place by use of a winch or other suitable means. A backhoe bucket or other means which could damage the pipe shall not be used. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary.

All pipe in place shall be inspected before backfilling, and those damaged during placement shall be removed and replaced at no additional cost to the Owner. No additional compensation will be given to the Contractor for the required diversion of drainage and/or dewatering of trenches.

9. BACKFILLING

Backfilling shall be done in accordance with Section 02221, "Excavation, Trenching and Backfill for Utility Systems."

10. SUBGRADE DRAINS

Subgrade drains will be provided from storm drain inlets where required. The subgrade drain will consist of a trench containing a 6-inch, 8-inch, and/or 12 inch perforated plastic pipe filled with granular material as shown in the detail on the Plans. The drain will extend in the direction shown on the plans. The drains will be constructed on a uniform slope toward the inlet.

11. SHOP DRAWINGS

Shop drawings shall be submitted on each manufactured item supplied under this Section along with other information as specified.

**END OF SECTION 02400**

## SECTION 02500

### BASE COURSE FOR CONCRETE PAVING

1. SCOPE

Under this heading shall be included the furnishing and installation of base course for concrete paving as shown including subgrade preparation, base course and pavement.

2. GENERAL

Subgrade preparation shall include leveling, proof-rolling and compacting of the subgrade as required. Installation of the base course shall include the placing and compacting of the material with appropriate equipment. Pavement shall be placed as shown on the plans. All work shall be in conformity with the lines, grades and typical cross-sections shown on the Plans. The Contractor must have all equipment and workers on the job site necessary to perform a given operation when it is initiated.

3. SUBGRADE PREPARATION:

The subgrade shall be brought to the line and grade necessary to accommodate the base and pavement at the required finished grades. All subgrade shall be proof-rolled as specified, before base course is placed on the subgrade.

4. BASE COURSE

A. Preparation of Base.

The surface of the base course will be inspected by the Engineer for adequate compaction and surface tolerances specified in applicable base course or sub-base course. Any ruts or soft yielding spots that may appear in the base course, any areas having inadequate compaction, and any deviations of the surface from the requirements specified for the base course shall be corrected by loosening the affected areas, by removing unsatisfactory material and adding approved material where required, and by reshaping and re-compacting to line and grade and to the specified density requirements. Compaction of base material shall be done by conventional means using a 30,000 to 40,000 pound vibratory roller or other means of obtaining the required compaction.

The lines and grades shown on the Contract Drawings for each pavement category of the Contract shall be established and maintained by means of line and grade stakes placed at the site of the work by the Contractor.

B. Stabilized Aggregate Base Course.

The aggregate in the base course shall consist of a mixture of either crushed gravel, together with sand, and gravel, soil or other materials having similar characteristics combined as necessary to give a mixture conforming to the requirements, prescribed herein. The material and installation shall meet the requirements of Section 310 of the Georgia Department of Transportation Standard Specifications.

<u>Sieve Designation</u>	<u>Percent By Weight Passing</u>
2"	100
1-1/2"	97-100
3/4"	60-90
No. 10	25-45
No. 60	5-30
No. 200	0-15

5. TESTING

The following tests will be made in accordance with the current edition of the appropriate Department of Transportation Standard Specifications. At least one density determination shall be made for each 300 square yards of base. Asphalt extraction and aggregate gradation on the asphaltic concrete plant mix: one for the first 250 tons placed and then one for each 500 tons of material delivered to the job site.

6. PROOF-ROLLING

Proof-rolling will be done with a loaded tandem dump truck (15 yards heaped) or as specified in the Department of Transportation Standard Specifications. Test rolling will be done parallel to the centerline at speeds between 2 and 5 miles per hour.

7. SUBGRADE STERILIZATION:

The Engineer will inspect the subgrade before paving. In areas specified by the Engineer, the Contractor will sterilize the subgrade with 1/2 pound of Parmitol No. 5 PG (manufactured by CIBA-GEIGY) per 100 square feet. Payment will be made for the contract Unit Price per square yard sterilized.

**END OF SECTION 02500**

## SECTION 02510

### CONCRETE PAVING

1. SCOPE

Under this heading shall be included the construction of concrete pavements.

2. STANDARD SPECIFICATIONS

All work under this Section shall be performed in accordance with the current edition of the Georgia Department of Transportation "Standard Specifications for Construction of Roads and Bridges," hereinafter referred to as the Standard Specifications, unless specifically changed by the Drawings or the requirements of this Section of the Project Specifications.

3. MATERIALS

A. Aggregate.

Coarse aggregate shall be crushed stone and shall conform to the requirements of Section 800 of the Standard Specifications and shall meet the requirements of Class A, Group 1 with respect to wear resistance. Fine aggregate shall conform to Section 801 of the Standard Specifications.

B. Cement.

Cement shall conform to the requirements of ASTM O-150, Type I.

C. Water.

Water used in mixing and curing shall be of potable quality.

D. Joint Sealer.

Sealer for joints shall meet the requirements of Section 833 of the Standard Specifications.

E. Joint Filler.

Preformed joint filler shall meet the requirements of Section 833.01 the Standard Specifications and shall be furnished in a single piece for the full width and depth of the required joint.

- F. Welded Wire Mesh.  
Reinforcement for concrete pavements shall meet the requirements of Sections 852.01 and 852.08 of the Standard Specifications.
- G. Admixtures. (No Fly-ash.)  
The Contractor shall submit certificates indicating that the material to be furnished meets all of the requirements indicated below. In addition, the Engineer may require the Contractor to submit complete test data from an approved laboratory showing that the material to be furnished meets all of the requirements of the cited specifications. Subsequent tests may be made of samples taken or proposed for use in the work to determine whether the admixture is uniform in quality with that approved.
1. Air-Entraining Admixtures.  
Air-entraining admixtures shall meet the requirements of ASTM C260 and shall be added to the mixer in the amount necessary to produce the specified air content. The air-entrainment agent and the water reducer admixture, if used together, shall be compatible.
  2. Water-Reducing Admixtures.  
Water-reducing, set-controlling admixtures shall meet the requirements of ASTM C494, Type A, water-reducing or Type D, water-reducing and retarding. Water-reducing admixtures shall be added at the mixer separately from air-entraining admixtures in accordance with the manufacturer's printed instructions.
- H. Forms.  
Forms for use in pavement construction shall be of metal construction, free of dents, bends and warps, and shall be cleaned and oiled prior to each use. Forms shall extend to the full height of the required pavement section and shall be sealed at joints as required to prevent grout loss and to insure a continuous smooth surface on the finished pavement.
- I. Curing Agents.  
Materials for curing shall conform to the requirements of Section 832 of the Standard Specifications.

4. EQUIPMENT

Equipment shall meet the requirements of Section 430.03 of the Standard Specifications and the additional requirements as specified herein.

5. CONSTRUCTION

Concrete pavement construction shall be in accordance with Section 430 of the Standard Specifications except as modified herein.

6. PROPORTIONS

Concrete mixes shall be designed to have the proportions of materials to provide a 28 day minimum flexural strength of 4000 psi, an entrained air content of 4.0 to 5.5 percent, a maximum slump of 2.5 inches and a maximum water-cement ratio (lbs./lb.) of 0.53, as required for Class No. 1 in accordance with Section 430.05 the Standard Specifications. The Contractor shall submit mix designs which have been verified by laboratory testing and which meet the requirements for strength, air content, water-cement ratio and slump as given above in accordance with Section 430.05 of the Standard Specifications. Variations from approved mix designs, for whatever purpose, will be permitted only upon written request by the Contractor and accompanied by new mix designs and the results of verification tests. Water shall not be added to concrete at the site of the work for any reason.

7. JOINTS

A. Joint Pattern.

The Contractor shall determine the joint pattern which best serves his equipment and operation. Joint spacing shall be within the limits shown on the Drawings except that the ratio of longitudinal to transverse spacing shall not exceed 1.25 and the maximum panel size will be 12-1/2 feet by 15 feet for concrete up to 8 inches thick. This ratio may be exceeded only at those intermediate joints at structure penetrations of the pavement. At such penetrations, an intermediate joint shall be constructed in the transverse direction which has an axis bisecting the penetration center. The Contractor shall submit for approval a jointing plan which includes, but is not limited to, the direction of paving and joint spacing dimensions, the type of joint as designated on the Drawings, the locations and intermediate joint locations at pavement penetrations and the sequence of paving operations. The plan shall be submitted to the Engineer at such time as required by the Standard Specifications for submittal of mix designs. Slight adjustment in location of drainage inlets will be permitted for the purpose of obtaining efficient joint patterns.



- B. Sawed Joints.  
The Contractor shall maintain the necessary personnel and equipment on the site at all times to insure joints are sawed at the appropriate time. Failure to saw joints at the appropriate stage of concrete set which results in uncontrolled cracking will be cause for the rejection of damaged pavement and such pavement shall be removed and replaced at no additional cost to the Owner.
- C. Joint Filler.  
Elastomeric joint filler shall only be placed on clean surfaces. All joint filler material yielded outside the joint and all over runs shall be removed.

8. FINISHING

The surface shall have a broom finish in accordance with Section 430 of the Standard Specifications, unless otherwise detailed by the Architect.

9. CURING

- A. Requirements.  
Curing shall be in accordance with Section 430 of the Standard Specifications except that for hot weather concreting, the use of burlap cover maintained in a wet condition for 7 days shall be required.
- B. Control.  
The Contractor shall maintain the necessary personnel and equipment on the site at all times to insure curing is initiated at the proper stage of concrete set. Uncontrolled cracking resulting from improper or untimely curing will be cause for rejection of the work and the removal and replacement of pavement at no additional cost to the Owner.

10. ACCEPTANCE LIMITS

- A. Thickness.  
Acceptance limits and payment adjustments for pavement thickness shall be in accordance with Section 430 of the Standard Specifications.
- B. Properties.  
Acceptance limits for properties other than thickness shall be in accordance with the Standard Specifications except as follows:

PROPERTY	SPECIFIED VALUE	LOWER ACCEPTANCE LIMIT	UPPER ACCEPTANCE LIMIT
Flexural Strength	psi	4000	4000
Slump	inches	2	2
Water Cement Ratio	lbs./lb.	0.53	0.53
Entrained Air	percent	5.5	4.5

The flexural strength of the concrete shall meet the following requirements: (1) the average of any 4 consecutive strength tests, tested at the end of 28 days, shall have an average flexural strength equal to or greater than the specified flexural strength; (2) not more than 20 percent of the beams tested at the end of 28 days shall have a flexural strength less than the specified strength. Specimens which are obviously defective shall not be considered in the determination of the strength. When the test specimens fail to conform to the requirements for strength, changes in the concrete mix shall be made to increase the strength to meet these requirements.

Materials not conforming to these limits will not be accepted in the work.

#### 11. TESTING

##### A. General.

All testing for quality assurance will be performed by a laboratory retained by Contractor.

##### B. Strength.

Flexure testing shall be performed in accordance with AASHTO T126 and T97. Each set for field control shall consist of 3 beam specimens obtained during concrete placement operations and 6 cylinders from the same load of material. Cylinders shall be tested in accordance with ASTM C496. Where adequate correlation is obtained, the Engineer may allow use of cylinders in place of beam testing.

##### C. Frequency.

The following table presents the minimum testing intervals for all concrete testing. The intervals may be increased during the work at the direction of the Engineer.

<u>TEST</u>	<u>FREQUENCY</u>
Flexure	One set per 800 square yards
Slump	One per each 3 delivery vehicles
Entrained Air	One per each 3 delivery vehicles
Density	One per each 5 delivery vehicles

12. CRACK CONTROL

The Contractor shall have total responsibility for the prevention of uncontrolled cracking of pavements from any cause. Cracks in pavements shall be repaired by removal and replacement of concrete pavement at no cost to the Owner. Cracks that occur within 2 feet of a joint for their total length shall be repaired by removal and replacement of concrete pavement between the crack and the adjacent joint. Other cracks shall be repaired by total removal and replacement of all pavement within the panel formed by adjacent joints. Subgrade repair made necessary by corrective operations shall be performed at no cost to the Owner. In the event that uncontrolled cracking occurs in two or more adjacent panels oriented in the direction of paving, the Contractor shall cease all placement of concrete and shall determine the cause. Upon determination of the cause, the Contractor shall submit to the Engineer such modifications to operations and/or materials as may be required to prevent additional cracking.

13. USE

The pavement shall be released to the Owner for use in completed condition at the end of the contract period. Such completion time shall include 28 days for curing. Use by the Owner will not constitute final acceptance for payment.

**END OF SECTION 02510**